

**Application No.:** 10/553,579  
**Filing Date:** April 20, 2006

### **REMARKS**

Claims 1-3, 5-16, and 21-31 were pending in this application prior to entry of the present amendments. Claims 14-16 and 21-31 were withdrawn in the Response to the Restriction Requirement filed on February 13, 2009. Claims 4 and 17-20 were cancelled in a previous action without prejudice. Applicants reserve the right to pursue the subject matter of the cancelled claims at a later date. Claim 1 has been amended by this paper. The present amendments do not add new matter. Support for amended Claim 1 can be found, for example, at least at paragraphs [0033], [0038] of the specification as originally filed.

#### **Election/Restriction**

The Office Action notes that “Applicant amended claim 1 to include a joint assembly and how the brake interacts with the joint assembly [and that the] structures of the joint assembly and how it interacts with the SMA brake are particular to the combination of a prosthesis as recited in the non-elected claim 14. Originally, Applicant had elected the invention of the brake to be examined.” Applicant submits that amended claim 1 reads on the elected invention. Applicant further notes that the Restriction Requirement of 13 November 2008 identified a restriction between claims directed to a brake and claims directed to a prosthetic limb. Applicant respectfully submits that amended claim 1 reads on the election made in response to said Restriction Requirement, and that amended claim 1 recites a brake assembly, not a prosthetic limb.

#### **Rejection under 35 U.S.C. § 112**

Claims 1-3 and 5-13 stand rejected under 35 U.S.C. §112, ¶1 because the Office Action asserts that “[t]he amended portion ‘wherein the moving away of said friction pad from said brake member induces longitudinal displacement of said linear shaft and induces corresponding rotation in said joint assembly’ is not supported by the specification as originally filed. When the friction pad moves away from the brake member, it does not induce motion of the linear shaft nor the joint assembly.” Applicant has amended claim 1 to clarify this limitation, which now reads, “wherein the moving away of said friction pad from said brake member allows a induces longitudinal displacement of said linear shaft and ~~induces a corresponding pivoting of rotation in~~

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said joint assembly,” and which Applicant submits is supported by at least the non-limiting embodiment described in paragraphs [0028], [0035]-[0036] of the originally filed specification. Therefore, Applicant requests the withdrawal of these rejections.

**Rejection under 35 U.S.C. § 103**

The Examiner rejected Claims 1-3 and 5-13 under 35 U.S.C. § 103(a) as being unpatentable over Daniels (US 6,045,076) in view of Chu (U.S. 5,831,417). Applicant respectfully traverses these rejections and the assertions made in the Office Action on what the cited art shows or teaches. However, in order to advance prosecution, Applicant has amended Claim 1 and submits that amended Claim 1 is also allowable over the cited art.

*Daniels*

Daniels discloses a fishing reel with electronic antibacklashing features dependent on sensed line condition. In connection with FIG. 26b (reproduced below), Daniels discloses an electronically variable brake comprising a bane member actuated by a shape memory alloy wire. The brake has a “first friction element 346 rotatable with the spool and a second friction element 348 held stationary relative to the rotation of the spool, and a shape memory alloy member 344 for driving the first friction element 346 into contact 314 with the second friction element 348 in response to the sensed overrun condition of the fishing line being released from the spool.” Daniels, col. 30 at ll. 48-61. “[A] spool holds and releases a length of fishing line, the spool having a longitudinal shaft 353 rotationally supported within the housing. The shaft 353 has a shaft friction surface (e.g., friction element 346). The electronically variable brake includes the shape memory alloy wire 344 and the friction surfaces 346, 348. The brake is coupleable with the spool for applying a braking force to resist rotation of the spool during casting to prevent the spool from overrunning the length of fishing line being released from the spool.” Daniels, col. 31 at ll. 5-13 (emphasis added). “A shape memory alloy member 344 is provided having a first end engaged with the second end of the band member 350 and a second end engaged with the support member 352 so that the shape memory alloy member 344 contracts and band member 350 is drawn in friction contact against shaft friction surface 348 to thereby resist rotation of the spool.” Id. at ll. 18-25. A circuit “supplies a current of electricity to the alloy wire 344 causing it to heat up and contract. The contraction of the wire 344 drives the friction surfaces 346, 348 into

contact and thus brakes the rotation of the spool. When the overrun condition is not present, the current is not applied to the wire 344, and a return spring 357 draws the friction surfaces 346, 348 apart as the wire 344 cools." Id. at ll. 39-45 (emphasis added).

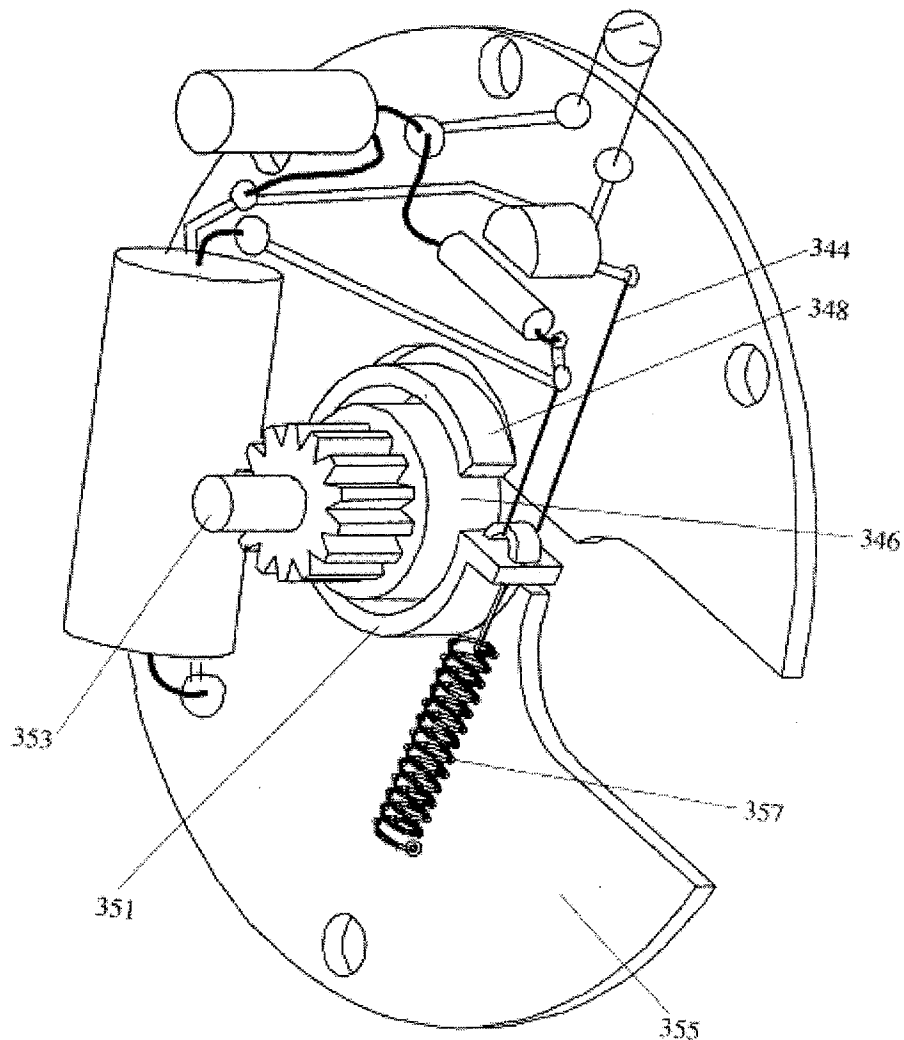
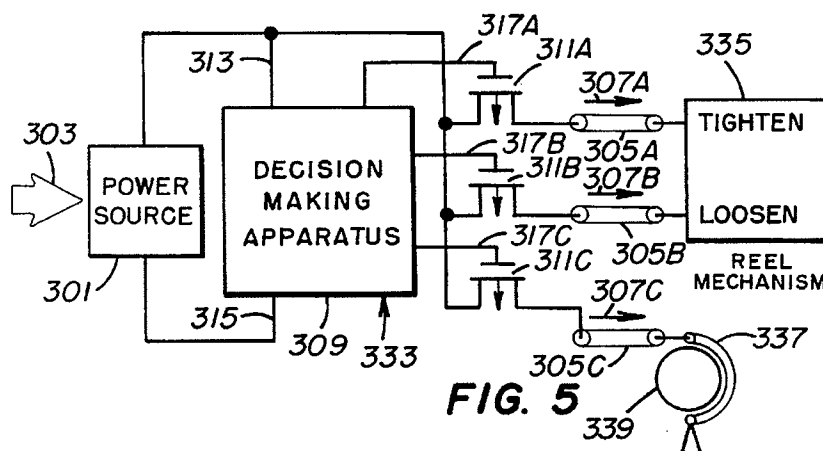


Figure 26(b)

*Chu*

Chu appears to disclose a generator “which converts mechanical energy into electrical energy to power...mechanical work.” Abstract. As an example, Chu’s Figure 5 below illustrates an electronic fishing reel. “[T]he reel handle or the spinning of the spool during bait casting can provide the mechanical energy...303 to power generator 301, which powers decision making apparatus 309.” See Chu, column 5 at ll. 16-19. “If a decision is made to tighten...the drag [of

the fishing reel (e.g., pressure applied to a number of disks or washers to vary the threshold fishing line tension], decision making apparatus 309 turns on [a] switch...311A...so that electric current 307A flows through ohmic electromechanical transducer 305A[, which] contracts and activates the reel mechanism 335..." *See id.* at ll. 24-29. "If a decision is reached to loosen the drag, decision making apparatus 309 turns on [a] switch...311B...so that electric current 307B flows through...wire 305B, whose contraction causes reel mechanism 335 to loosen..." *See id.* at ll. 29-33. Chu also discloses a brake apparatus, where "short pulses of electrical current 307C flow through SMA wire 205C. Resulting from the ohmic heating of these electrical current pulses, short and crisp contractions of SMA wire 305C pull brake shoe 337 against brake drum 339 with sort and crisp jabs, simulating the light pressure applied to the fishing line on the spool by the angler." Chu, col. 5 at ll. 60-66. When "the short electrical current pulses 307C turn into a direct electrical current[, the] continuous electrical current 307C heats SMA wire 305C and causes it to contract continuously to pull brake shoe 337 continuously against brake drum 339, which is part of the spool, forcing the spool to come to an abrupt stop." Chu, col. 6 at ll. 10-15.



Applicant submits that neither Daniels nor Chu, alone or in combination, teach or suggest all of the features of amended claim 1, so that claim 1 is allowable over the combination of Daniels and Chu. For example, neither Daniels nor Chu teaches or suggests, among other things, a friction brake assembly comprising a first actuator comprising at least one shape memory alloy element and a second actuator comprising at least one shape memory alloy element, "wherein the first and second actuators are configured to change in length only when an electric current is

applied thereto such that the length of the actuators remains unchanged upon removal of the current, thereby allowing the friction pad and brake member to remain in a stable position without the continued application of electrical power to the first and second actuators,” as recited, among other features, in amended claim 1. Rather, as noted above, Daniels teaches that “when the overrun condition is not present, the current is not applied to the wire 344, and a return spring 357 draws the friction surfaces 346, 348 apart as the wire 344 cools.” Daniels, col. 31 at ll. 39-45. Therefore, the length of the wire 344 changes when a current is not applied thereto. Chu does not cure this deficiency in Daniels. As discussed above, short electrical pulses of electrical current result in short and crisp contractions of SMA wire 305C. Therefore, Chu teaches that once the electrical current is removed, the length of the SMA wire returns to its previous length.

Additionally, Applicant submits that neither Daniels nor Chu teach or suggest, among other things, “a first actuator comprising including at least one shape memory alloy element, said first actuator being operatively coupled to operable upon said carrier and actuatable to move said friction pad into engagement with said brake member to apply a braking force on the brake member, wherein the engagement of said friction pad with said brake member inhibits longitudinal displacement of said linear shaft and inhibits a corresponding pivoting of rotation in said joint assembly; and a second actuator comprising including at least one shape memory alloy element, said second actuator operatively coupled to being operable upon said carrier and actuatable to move said friction pad away from said brake member to remove said braking force, wherein the moving away of said friction pad from said brake member allows a induces longitudinal displacement of said linear shaft and induces-a corresponding pivoting of rotation in said joint assembly,” as recited among other features in amended claim 1. For example, contrary to the assertions made in the Office Action, neither Daniels nor Chu teach or suggest that application of the braking force “inhibits longitudinal displacement of said linear shaft” or that removal of the braking force “allows a longitudinal displacement of said linear shaft.” Rather, as noted above, the longitudinal shaft 353 of the reel in Daniels is “rotationally supported within the housing.” Chu does not cure this deficiency in Daniels since there is no discussion in Chu of a longitudinally displaceable shaft.

The Office Action asserts that Daniels teaches all of the features of claim 1, except that “Daniels shows a spring as a second actuator while the claim requires an SMA as a second actuator.” Office Action, page 4. The Office Action then asserts that Chu teaches the use of two SMA actuators because “the reel mechanism 335 is actuated by two SMA actuators 305A, 305B wherein actuator 305A engages the drag while actuator 305B releases the drag of the reel mechanism. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Daniel’s brake to employ an SMA actuator as a second actuator in the brake of Daniel instead of a spring, in order to maintain an engage state or a release state of the brake without constant supply of current to each SMA as taught by Chu.” *Id.* Applicant disagrees.

First, Applicant notes that the two SMA wires 305A, 305B in Chu that the Examiner refers to are for varying the drag of the reel, which is defined in Chu as “the pressure applied to a number of disks or washers whose stationary friction sets the threshold of line tension beyond which slippage among disks or washers occurs.” Chu, col. 5, ll. 8-11. Therefore, the SMA wires 305A, 305B are not used to brake the reel, but to adjust the tension of the fishing line based on pressure applied to disks or washers. Accordingly, modifying the reel of Daniels with this teaching of Chu would not result in a brake system with first and second actuators, as claimed, but would rather result in a reel with a variable drag mechanism. Moreover, Chu discloses a brake for the reel (see Chu, FIG. 5), where a brake shoe 337 is pulled against a brake drum 339 to brake the reel via an SMA wire 305C. There is no discussion in Chu of the brake having a second SMA wire to move the brake shoe 337 **away** from the brake drum 339. Further, as discussed above, Chu teaches that the brake shoe 337 is brought against the brake drum 339 in “short and crisp jabs” resulting from the short electrical pulses that flow through the SMA wire 305C, so that the brake shoe 337 disengages from the brake drum 339 when the current is not present. Therefore, there would be no need for the brake in Chu to employ a separate SMA wire to “move” the brake shoe 337 away from the brake drum 339.

Additionally, Applicants assert that the Office Action does not provide a reason for why one of skill in the art would modify the device of Daniels with the teachings of Chu. In *KSR*, the Supreme Court explained that “a patent composed of several elements is not proved obvious

merely by demonstrating that each element was, independently, known in the prior art.” *Id.* at 1739. It further explained that “[r]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” *Id.*, citing *In re Kahn*, 441 F. 3d 977, 988 (Fed. Cir. 2006). “To facilitate review, this analysis should be made explicit.” *Id.* Furthermore, “[a] fact finder should be aware, of course, of the distortion caused by hindsight bias and must be cautious of arguments reliant upon ex post reasoning.” *KSR*, 127 S. Ct. at 1742, citing *Graham*, 383 U.S. at 36 (warning against a “temptation to read into the prior art the teachings of the invention in issue” and instructing courts to “guard against slipping into the use of hindsight”).

The Office Action states “[i]t would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Daniel’s brake to employ an SMA actuator as a second actuator in the brake of Daniel instead of a spring, in order to maintain an engage state or a release state of the brake without constant supply of current to each SMA as taught by Chu.” However, there is no suggestion whatsoever in Chu that the disclosed reel assembly brake suffered from not being able to “maintain an engaged state or a release state of the brake without a constant supply of current,” as suggested by the Office Action. Rather, as noted above, Chu specifically teaches a reel brake where short current pulses causes a brake shoe 337 to be pulled in short and crisp jabs against a brake drum 339. Chu, col. 5 at ll. 60-67. Where an abrupt stop is needed, a continuous electrical current is provided to cause the brake shoe 337 to continuously contact the brake drum 339. Chu, col. 6 at ll. 10-16. In fact, Chu teaches that both the “short and crisp” braking mode and continuous braking modes are desirable, so that the angler can slow down the spinning of the reel by applying light pressure during bait casting, and clamp down on the spool and bring it to an abrupt stop the moment the bait hits the water. See Chu, col. 5 at ll. 48-56. Therefore, Applicants submit that the reason provided by the Office Action for why one of skill in the art would modify the device of Daniels with the teachings of Chu is not in fact a reason suggested by Chu (or by Daniels) and so does not provide an “articulated reasoning with some rational underpinning to support the legal conclusion of obviousness,” as required by *KSR*. Applicant respectfully submits that the Office Action instead identifies said reasoning for

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modifying Daniels with Chu based on Applicant's own specification and invention, and therefore said reasoning is impermissibly based on hindsight.

Accordingly, Applicants submit that Claim 1 is patentable over the cited references, that the combination of Daniels and Chu do not establish a prima facie case of obviousness, that the Office Action does not provide a reason for why one of skill in the art would combine the references.

#### Dependent Claims

As Claims 2-3 and 5-13 depend from amended Claim 1 and recite additional distinguishing features, Applicants respectfully submit that Claims 2-3 and 5-13 are likewise allowable over Daniels in view of Chu as each of these claims recites a unique combination of features not taught or suggested by the cited art.

#### CONCLUSION

Applicants submit that the claims are in condition for allowance and respectfully request the same. Although the present communication may include alterations to the application or claims, or characterizations of claim scope or referenced art, Applicants are not conceding in this application that previously pending claims are not patentable over the cited references. Rather, any alterations or characterizations are being made to facilitate expeditious prosecution of this application. Applicants reserve the right to pursue at a later date any previously pending or other broader or narrower claims that capture any subject matter supported by the present disclosure, including subject matter found to be specifically disclaimed herein or by any prior prosecution. Accordingly, reviewers of this or any parent, child or related prosecution history shall not reasonably infer that Applicants have made any disclaimers or disavowals of any subject matter supported by the present application.

Furthermore, any remarks in support of patentability of one claim should not be imputed to any other claim, even if similar terminology is used. Any remarks referring to only a portion of a claim should not be understood to base patentability on that portion or that the limitation discussed is essential or critical; rather, patentability must rest on each claim taken as a whole. Applicants respectfully traverse each of the Examiner's rejections and each of the Examiner's assertions regarding what the prior art shows or teaches, even if not expressly discussed herein.



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Although changes to the claims have been made, no acquiescence, disclaimer or estoppel is intended or should be implied thereby; such amendments are made only to expedite prosecution of the present application and are without prejudice to the presentation or assertion, in the future, of claims relating to the same or similar subject matter. Applicants may not have presented in all cases, arguments concerning whether the applied references can be properly combined or modified in view of the deficiencies noted above, and Applicants reserve the right to later contest whether the cited references can be properly combined or modified.

The undersigned has made a good faith effort to respond to all of the rejections in the case and to place the claims in condition for immediate allowance. Nevertheless, if any undeveloped issues remain or if any issues require clarification, the Examiner is respectfully requested to call Applicants' attorney in order to resolve such issue promptly.

Please charge any additional fees, including any fees for additional extension of time, or credit overpayment to Deposit Account No. 11-1410.

Respectfully submitted,

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Dated: September 15, 2010

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